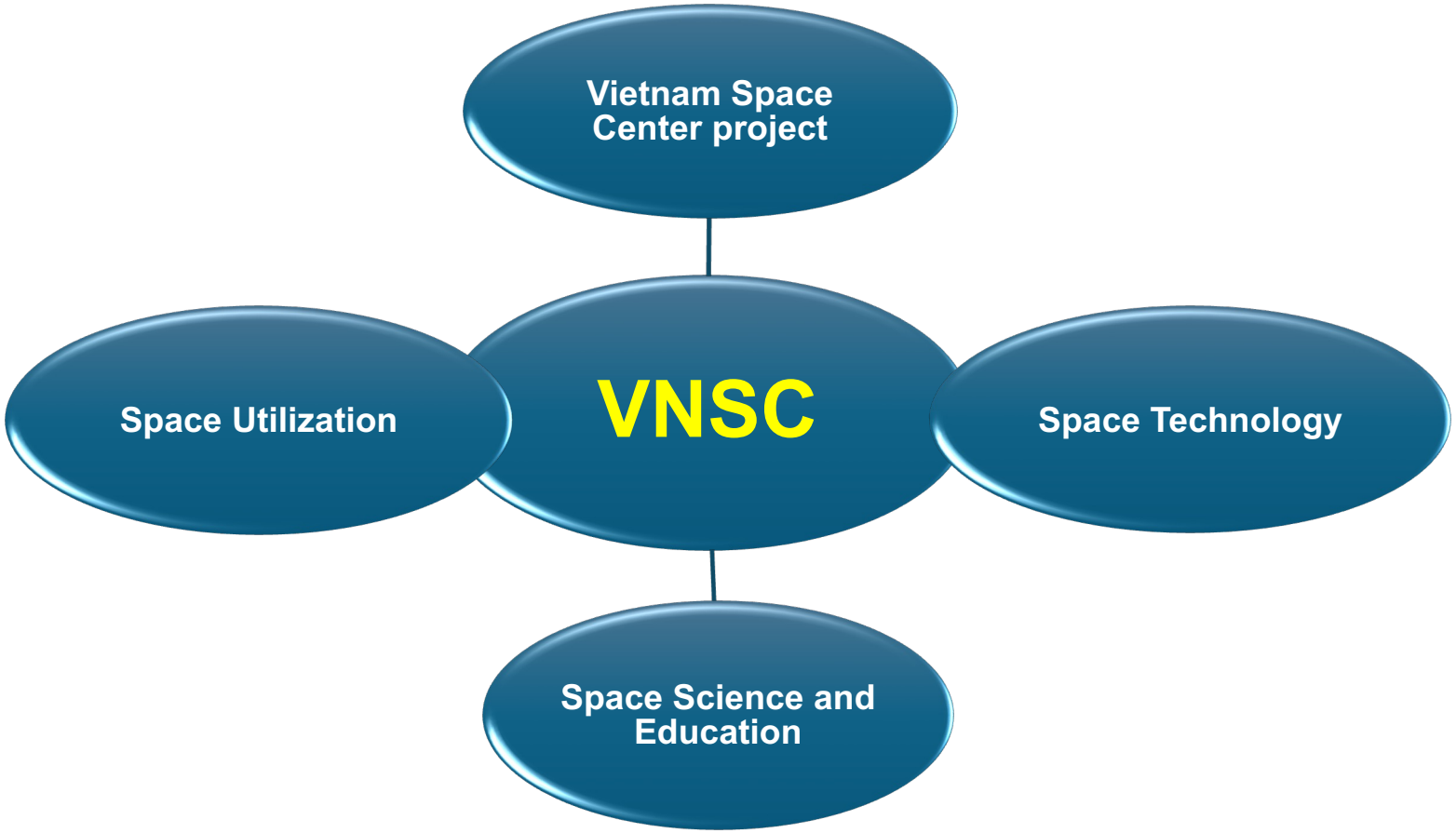
VNSC and LOTUSat-1 Update

Dr. Vu Anh Tuan
Vietnam National Space Center

SAGA, Nov. 2024

About VNSC

On Sep. 16, 2011, **Vietnam National Space Center** was established under **Vietnam Academy of Science and Technology (VAST)**

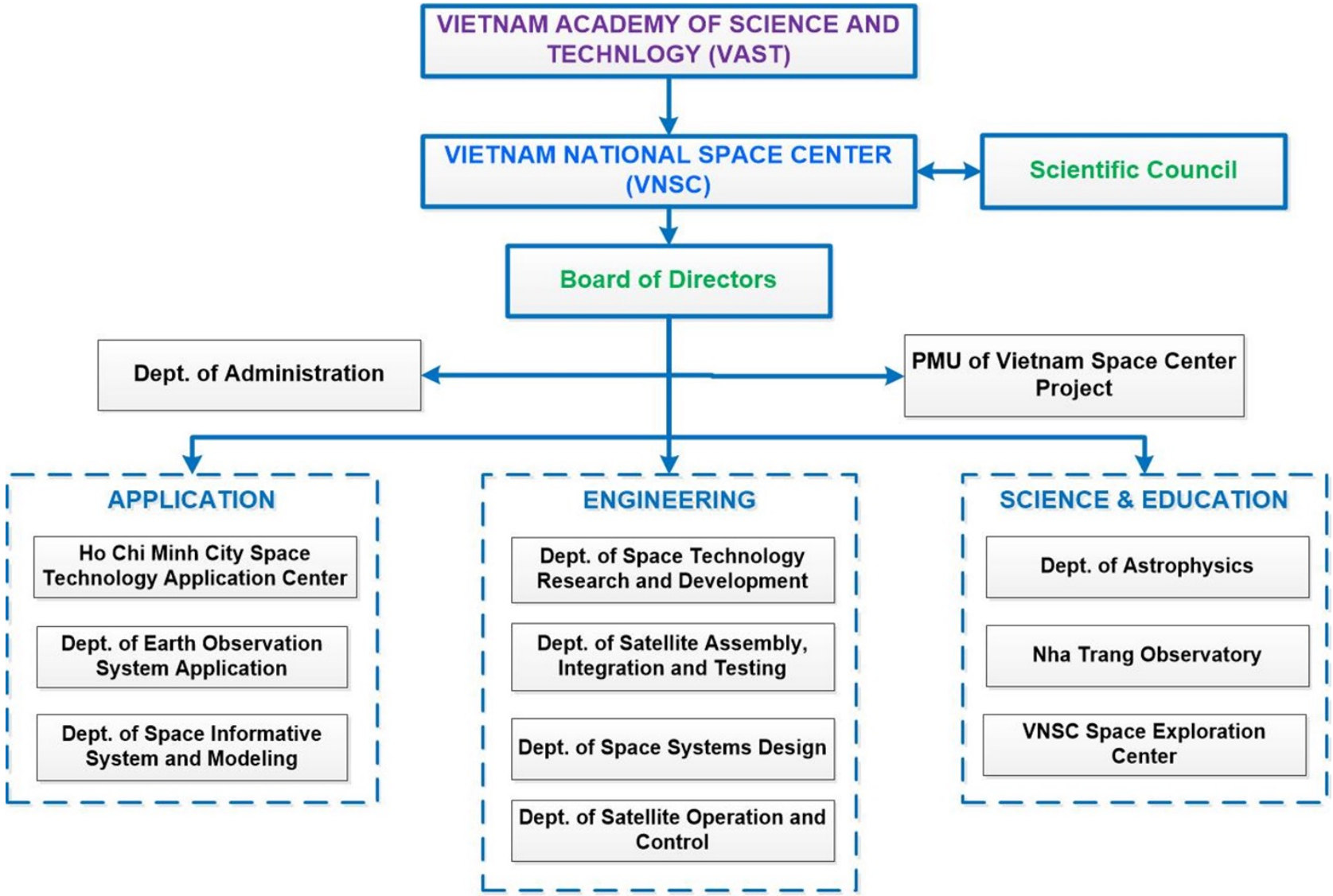


About VNSC

Main missions of VNSC:

- To improve national earth observation capacity;

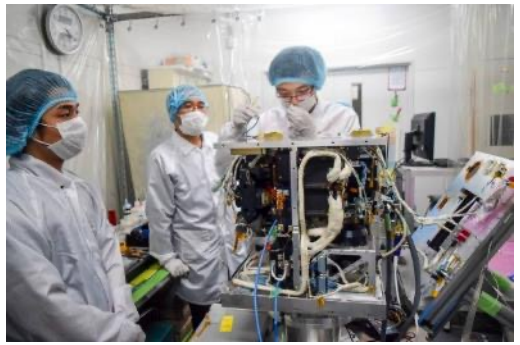
- To develop satellites in Vietnam



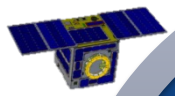
LOTUSat-1

PROJECT FOR DISASTER AND CLIMATE CHANGE COUNTERMEASURES USING EARTH OBSERVATION SATELLITE

- VNSC project and LOTUSat-1



Capacity Building for Satellite Development (over 100 staffs)

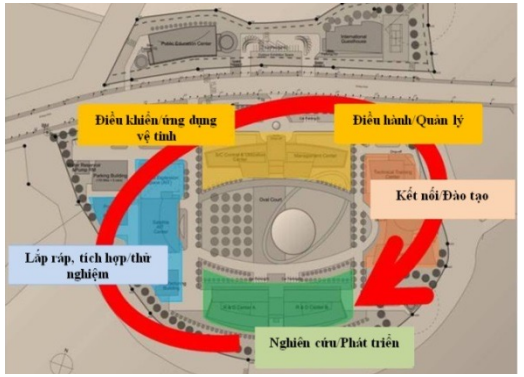


MicroDragon



LOTUSat-1 (570 kg) with radar payload

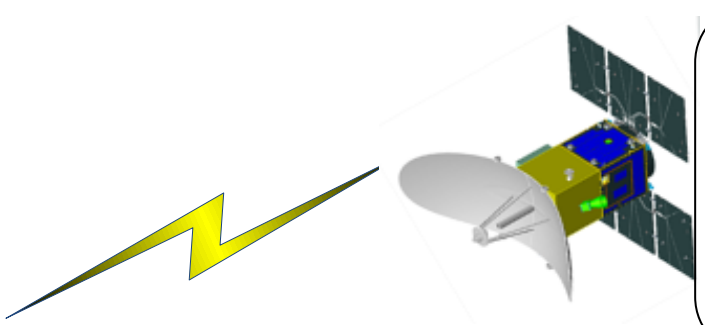
Infrastructure in Ha Noi, Nha Trang and HCM City



AIT facilities for small satellites up to 180kg

LOTUSat-1

- Specification



SAR Satellite

Mass: ~570kg
Life: >5 years
Size: Approx. 1.5m x 1.5m x 3m

<Mission>
X-band SAR sensor
Resolution: ~ 1.0m -16m



Ground Station
(7 m S&X band antenna)

Users

Requirement, Information and Data



Satellite Operation Center

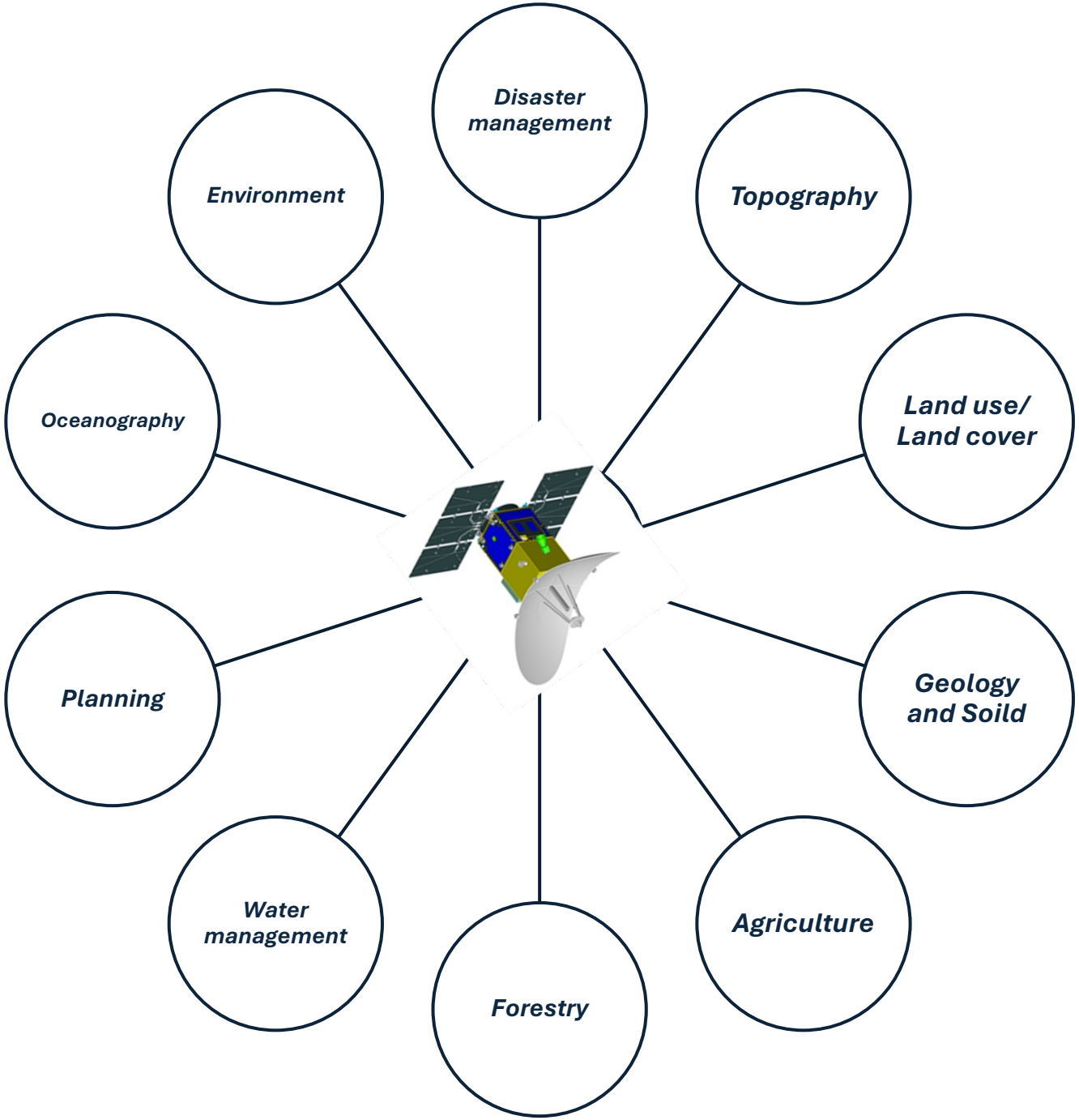


Mission Data Utilization Center

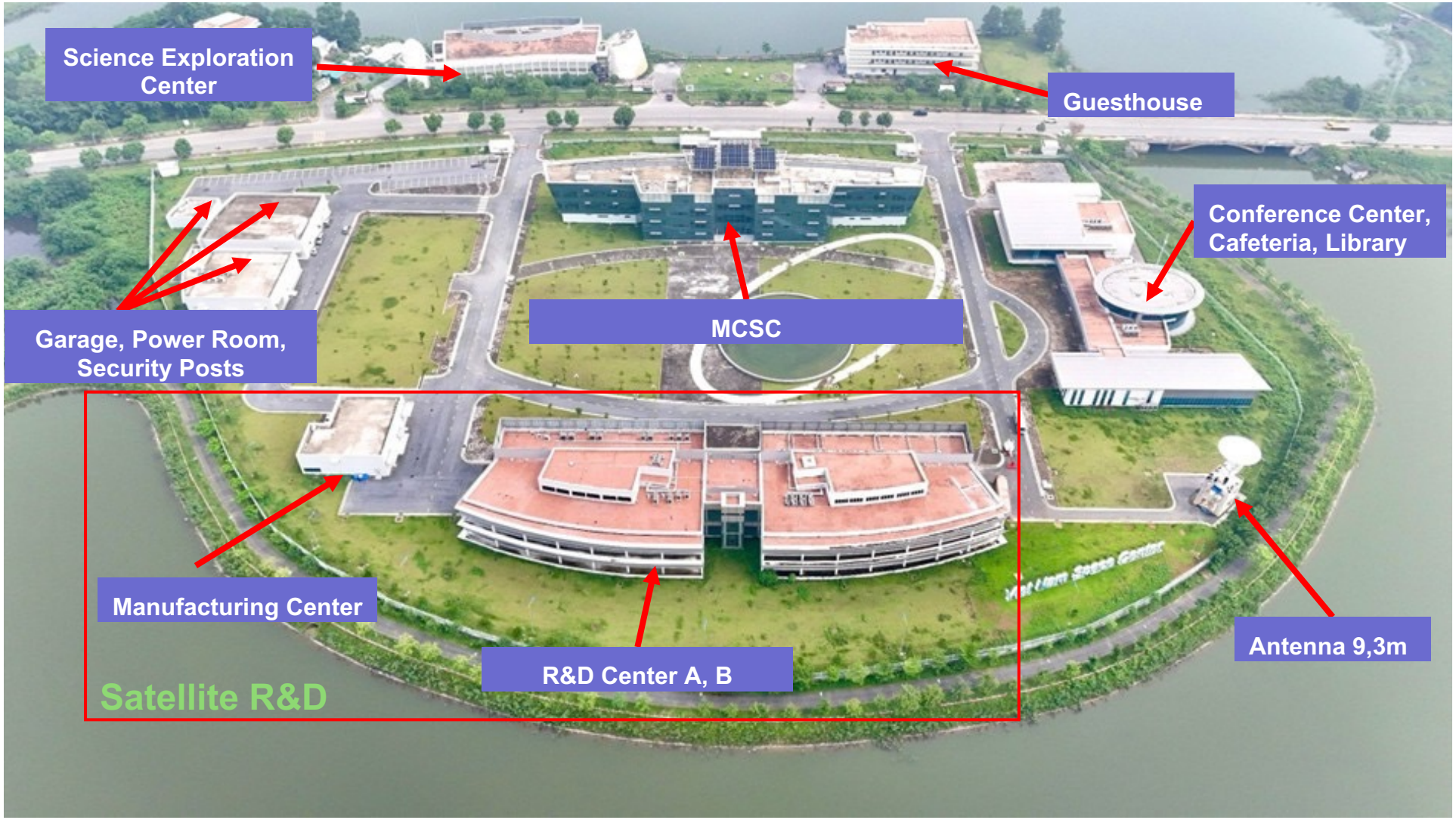
LOTUSat-1

- Goals/Applications

SAR Frequency	X - band
Resolution - Spotlight mode	1m x 1m (10km x 10km)
Resolution - Stripmap mode	2m x 2m (12km x 800km)
Resolution - Scan mode	16m x 16m (50km x 800km)
Polarization	HH or VV (switchable)
Look direction	Left or Right
Incidence angle	15°~ 45°
Data downlink	X-band / RHCP 16QAM(832Mbps)/QPSK(416Mbps)



Present Situation










Viet Nam Sports Center



1. *Import instruments:* *5/2024*
2. *Installation and testing:* *5-6/2024*
3. Integration: 6-7/2024
4. Experimental operation: 8/2024
5. Ground Station Handover: 9/2024
6. Operation training: 9-10/2024
7. Launch: 2/2025
8. Experimental operation, in-orbit: 3-5/2025
9. Post-Handover Operation Support: 6-9/2025

➔ **VNSC receives satellite and operates for 05 years from 1/6/2025 to 31/5/2030**





Ground Station - GS





Server SOC/MDUC Room

Present Situation

- LOTUSat-1





Present Situation

- Ground segment



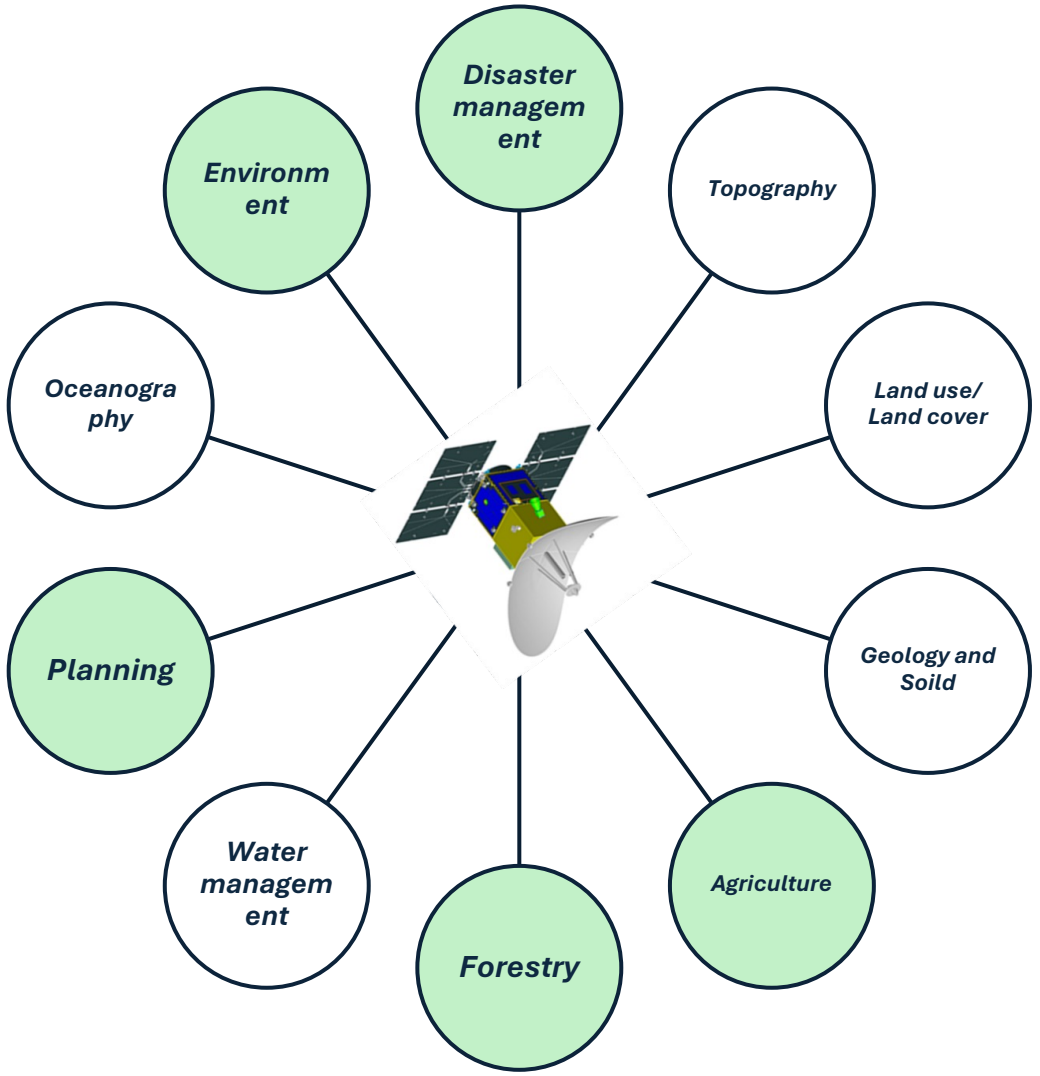


Plan

- Data Policy
  - Free of charge for Gov. Users
- Data distribution
  - By VNSC
  - Order via website
- Connecting to present satellite data base
  - Vietnam Data Cube
  - Other data base operated by National Remote Sensing Department
- Providing data for research projects
  - To promote the LOTUSat-1 data using

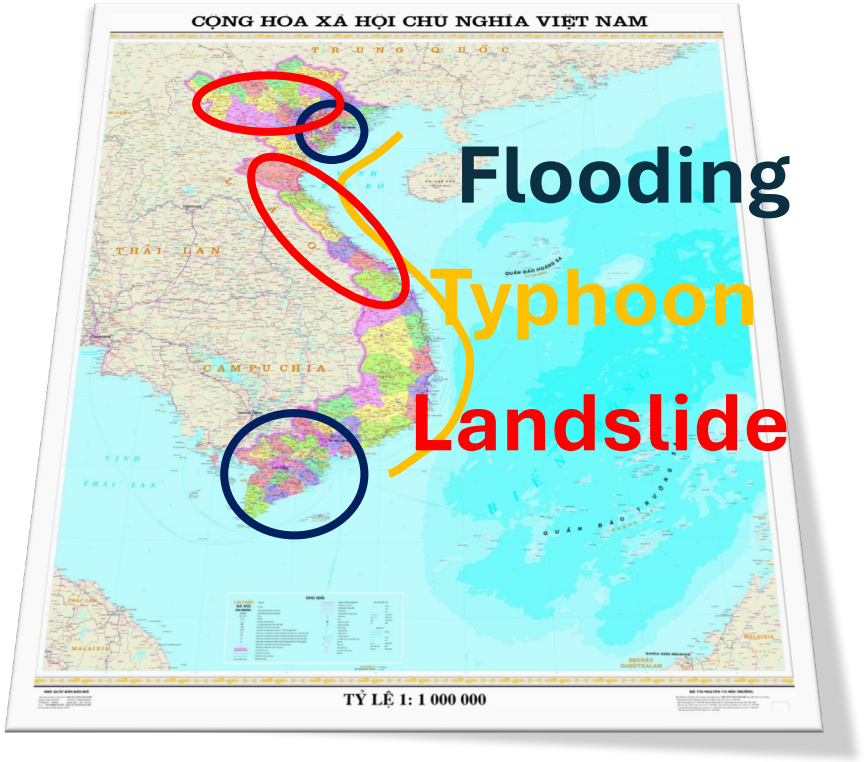
Plan

- Application
  - Disaster management
  - Forestry
  - Planning
  - Agriculture
  - Environment management



Plan

The first priority: Disaster



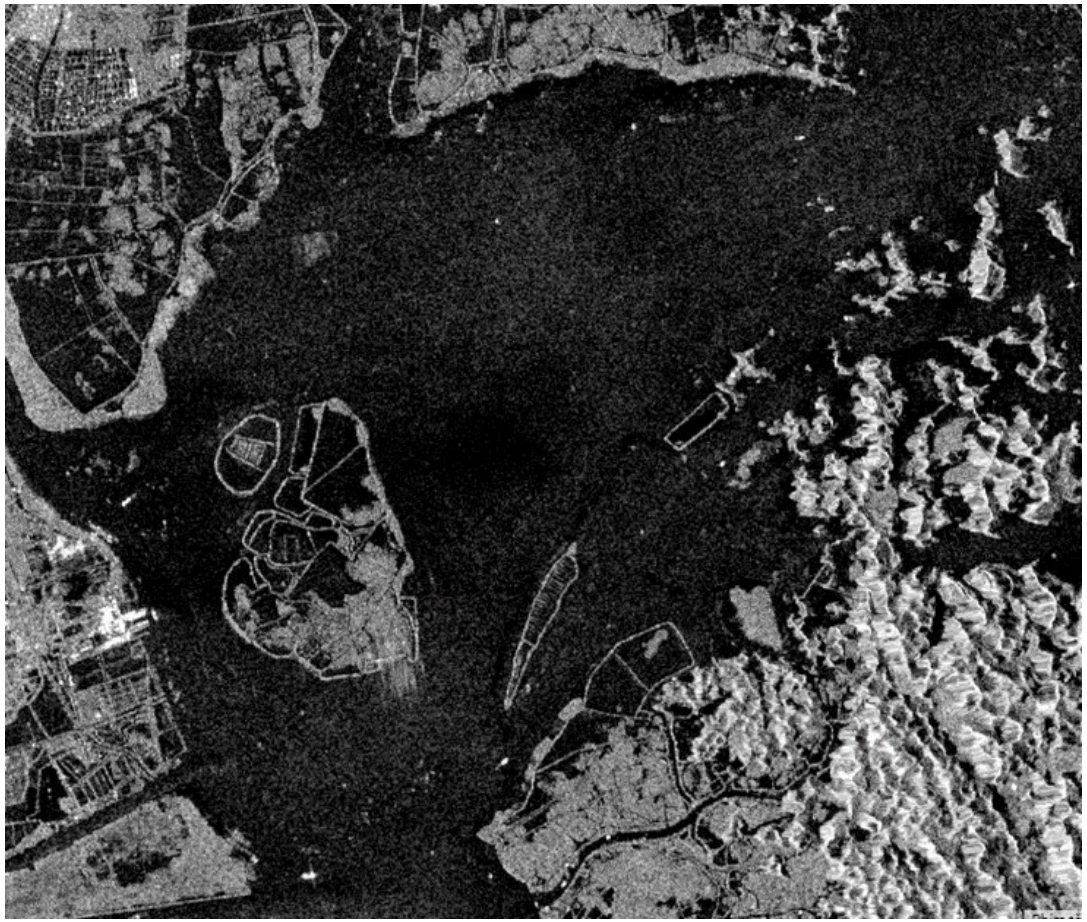
- 2020:
  - 7 typhoons continuously hit the central part of Vietnam
  - 247 death and missing, mainly by landslide and flooding
  - $US 1.5 billion for 2020
- 2024:
  - Yagi typhoon
  - 345 death and missing
  - $US 3.4 billion

SAR data can help

Plan

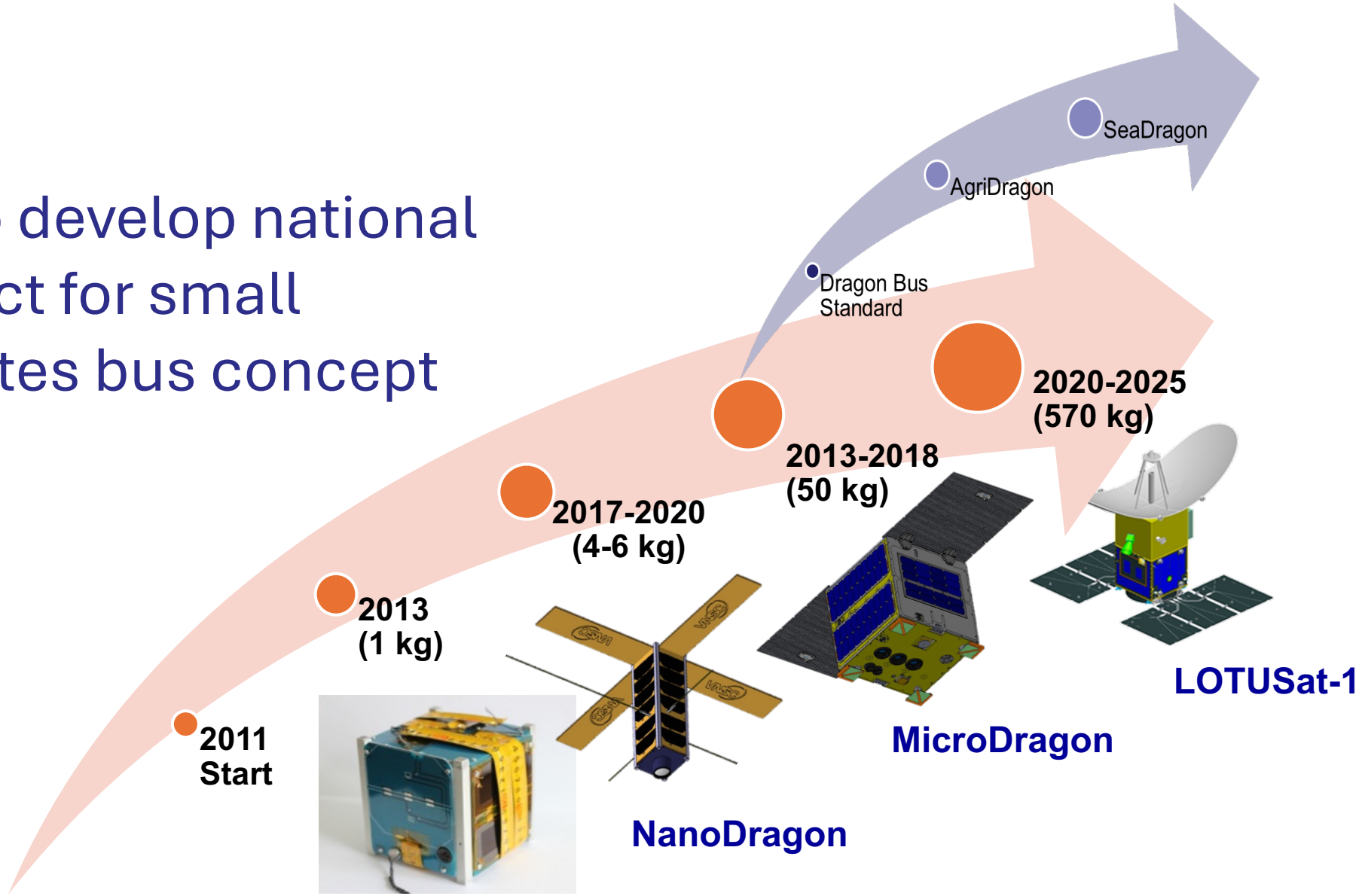
SAR for flood mapping (in case of typhoon Yagi, VNSC map in 10th, 12th and 15th September)
SAR for quick estimation of loss by typhoon

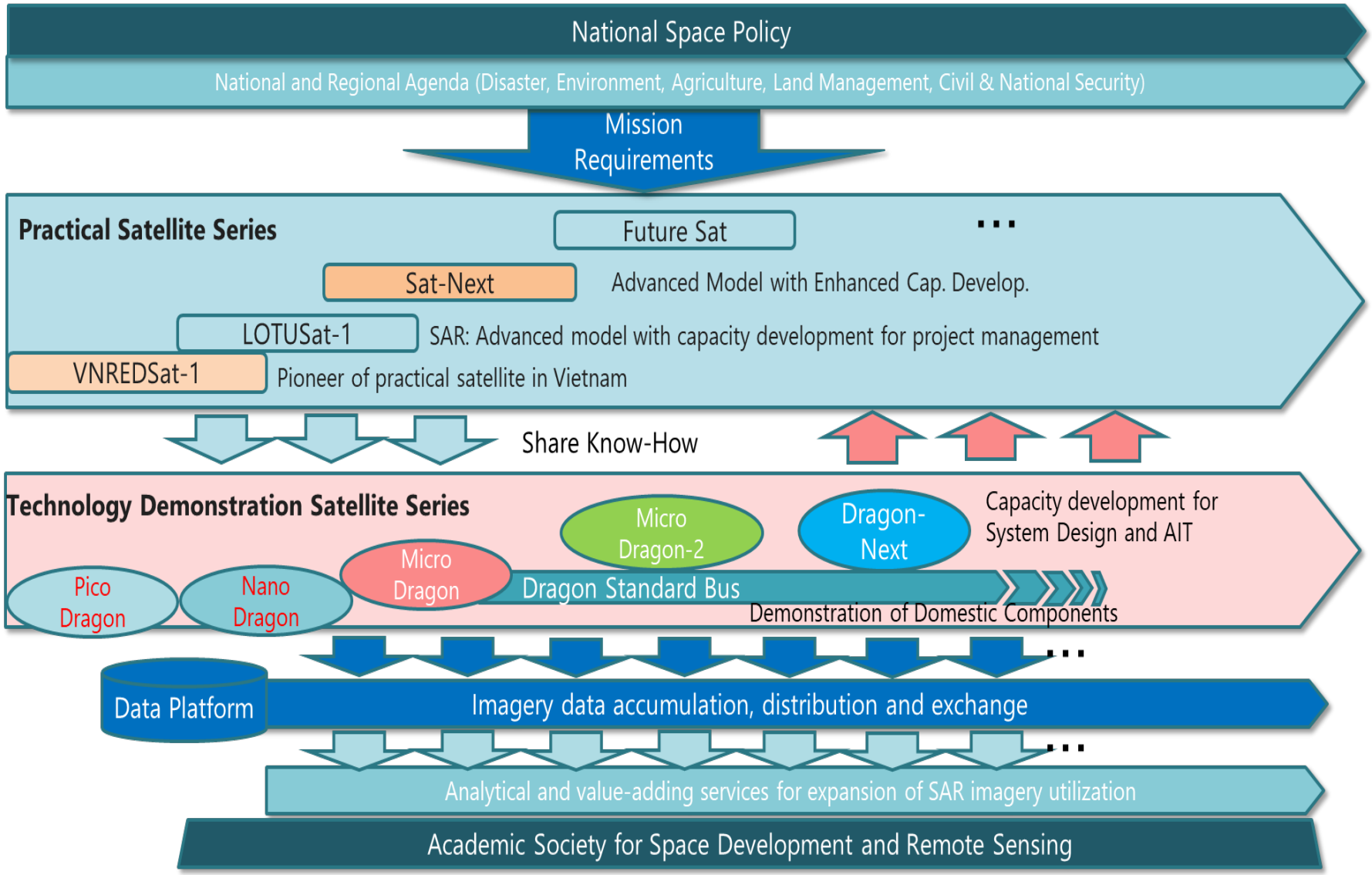


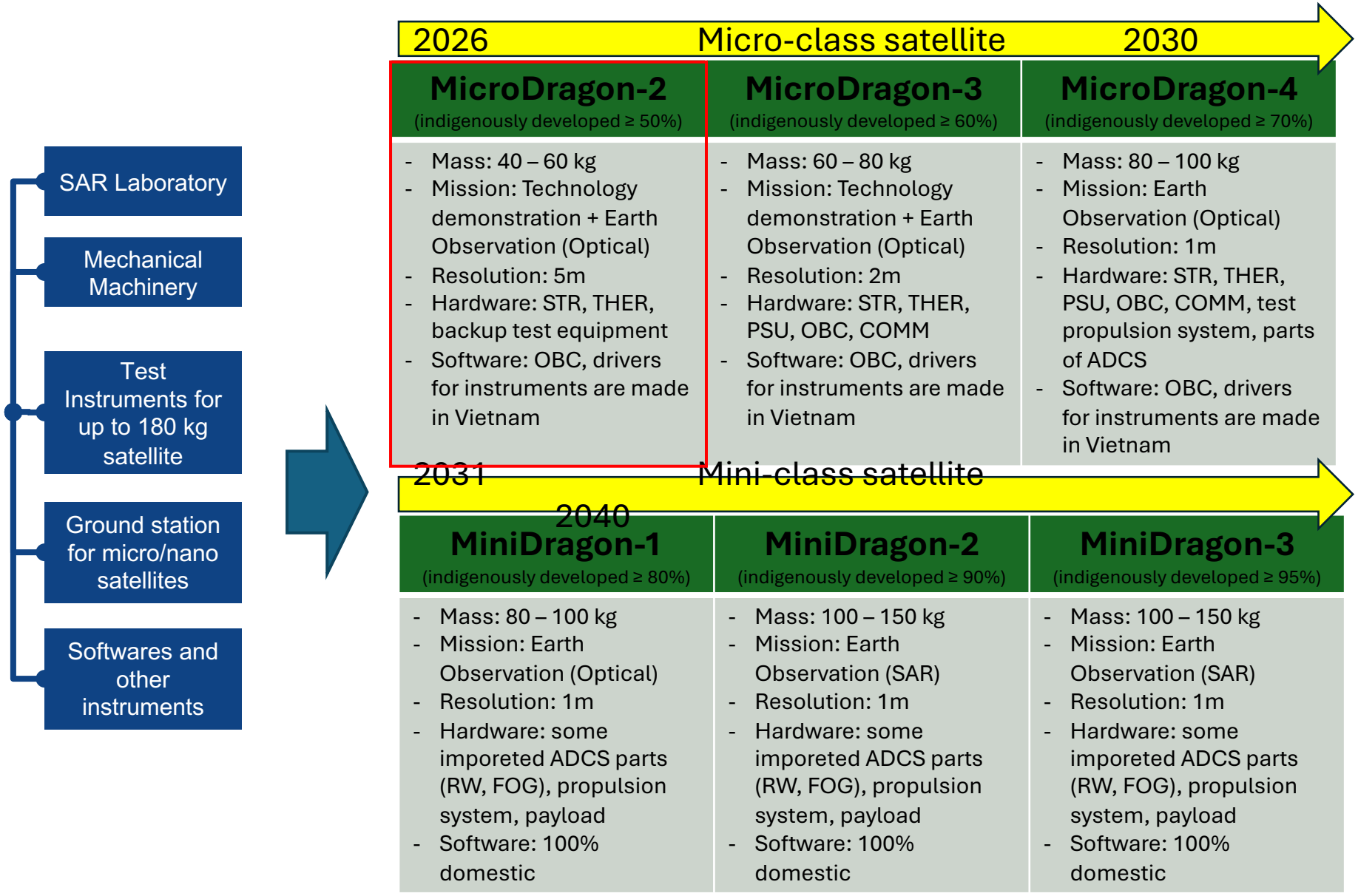


Plan

Aim to develop national product for small satellites bus concept




National Space Policy
National and Regional Agenda (Disaster, Environment, Agriculture, Land Management, Civil & National Security)
Mission Requirements
Practical Satellite Series
Future Sat
...
Sat-Next
Advanced Model with Enhanced Cap. Develop.
LOTUSat-1
SAR: Advanced model with capacity development for project management
VNREDSat-1
Pioneer of practical satellite in Vietnam
Share Know-How
Technology Demonstration Satellite Series
Micro Dragon-2
Dragon-Next
Capacity development for System Design and AIT
Micro Dragon
Pico Dragon
Nano Dragon
Dragon Standard Bus
Demonstration of Domestic Components
...
Data Platform
Imagery data accumulation, distribution and exchange
...
Analytical and value-adding services for expansion of SAR imagery utilization
Academic Society for Space Development and Remote Sensing


SAR Laboratory
Mechanical Machinery
Test Instruments for up to 180 kg satellite
Ground station for micro/nano satellites
Softwares and other instruments
2026
Micro-class satellite
2030
MicroDragon-2
(indigenously developed ≥ 50%)
- Mass: 40 – 60 kg
- Mission: Technology demonstration + Earth Observation (Optical)
- Resolution: 5m
- Hardware: STR, THER, backup test equipment
- Software: OBC, drivers for instruments are made in Vietnam
MicroDragon-3
(indigenously developed ≥ 60%)
- Mass: 60 – 80 kg
- Mission: Technology demonstration + Earth Observation (Optical)
- Resolution: 2m
- Hardware: STR, THER, PSU, OBC, COMM
- Software: OBC, drivers for instruments are made in Vietnam
MicroDragon-4
(indigenously developed ≥ 70%)
- Mass: 80 – 100 kg
- Mission: Earth Observation (Optical)
- Resolution: 1m
- Hardware: STR, THER, PSU, OBC, COMM, test propulsion system, parts of ADCS
- Software: OBC, drivers for instruments are made in Vietnam
2031
Mini-class satellite
2040
MiniDragon-1
(indigenously developed ≥ 80%)
- Mass: 80 – 100 kg
- Mission: Earth Observation (Optical)
- Resolution: 1m
- Hardware: some imporeted ADCS parts (RW, FOG), propulsion system, payload
- Software: 100% domestic
MiniDragon-2
(indigenously developed ≥ 90%)
- Mass: 100 – 150 kg
- Mission: Earth Observation (SAR)
- Resolution: 1m
- Hardware: some imporeted ADCS parts (RW, FOG), propulsion system, payload
- Software: 100% domestic
MiniDragon-3
(indigenously developed ≥ 95%)
- Mass: 100 – 150 kg
- Mission: Earth Observation (SAR)
- Resolution: 1m
- Hardware: some imporeted ADCS parts (RW, FOG), propulsion system, payload
- Software: 100% domestic

Conclusion

- VNSC is on going to develop satellites in Vietnam
- LOTUSat-1, the 1st SAR satellite of Vietnam is ready to be launched
- Application is important in plan of using LOTUSat-1 data. In case of Vietnam, it should be disaster management, forestry, agriculture (rice mapping), planning.

Thank you

